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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/226,971
Filing Date: January 08, 1999
Appellant(s): MARRA ET AL.

Todd T. Taylor
For Appellant

SUPPLEMENTAL EXAMINER'S ANSWER

Pursuant to the Remand under 37 CFR 1.193(b)(1) by the Board of Patent Appeals and Interferences on 8/19/2004, a supplemental Examiner's Answer is set forth below:

The examiner's answer of April 8,2002 is incorporated herein by reference and supplemented by the following.

1. Claims 1 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Hsieh 5,212,434.

Hsieh provides a reference signal (output of 81) and generates a plurality of digital signals defining a reference pulse train (output of 82) with a frequency dependent upon the reference signal (the pulse train output of 82 has a frequency equal to the reference signal frequency divided by N2). Hsieh provides a target system to be regulated (40,50,60) and the target system provides an output in the form of a plurality of digital signals defining a feedback pulse train (output of 60). Hsieh further compares (at 10) the frequency of the reference pulse train (output of 82) with the frequency of the feedback pulse train (output of 60); generates a control signal based on the comparison (output of 31); and provides the control signal as an input to the target system.

See figure 1 and note elements 10, 30, 31, 60, 82 and their description. Also note that the frequency output of element 82 is dependent on the control signal output by element 70 and that the pulse output of element 60 is a function of time (varies with time).

Additionally in response to applicant's arguments, element 10 inherently serves to compare the reference pulse train frequency to the feedback pulse train frequency. This statement of inherency can be shown as follows.

Hsieh in figure 1 shows inputting signals $P_2(t), \omega_2, \Theta_2$ and $P_1(t), \omega_1, \Theta_1$ into element 10 and note that both ω_2 and ω_1 are used implying that the frequencies of the two signals ω_2, ω_1 are not the same. Further Hsieh even labels element 10 using the initials PFD which stands for phase-frequency detector. This statement about the meaning for PFD finds support in the article " A Phase/Frequency-Locked Controller for Stepping Servo Control Systems" by Jung-Chien Li and Guan-Chyun Hsieh (Hsieh is the inventor of the 5,212,434 patent being used in the claim rejection). Specifically support for this assertion about the meaning of PFD is found at page 116, second column, in which it is revealed that the "phase comparator " is actually a frequency-phase comparator (MC4044) not just a phase detector. In other words the PFD also compares frequencies and is not solely a phase detector as applicant argues. Note also the block diagram of Figure 5 in the article labels the "phase detector " as a PFD just as the "phase detector" in the patent is labeled. Additionally note the similarity and common features between the block diagram of figure 5 of the article and figure 1 of the 5,212,434 patent. In view of this showing it is clear that the PFD of the Hsieh patent serves to compare frequencies not just phases as applicant argues. A copy of the article " A Phase/Frequency-Locked Controller for Stepping Servo Control Systems" by Jung-Chien Li and Guan-Chyun Hsieh from IEEE Transactions on Industrial

Electronics , Vol. 39,No. 2, April 1992 pages 112-119 is being provided to support the showing of inherency.

2. Claims 2 , 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh 5,212,434 in view of either Long 4,494,509 or O'Sullivan 6,043,695.

Hsieh provides a reference signal (output of 81) and generates a plurality of digital signals defining a reference pulse train (output of 82) with a frequency dependent upon the reference signal (the pulse train output of 82 has a frequency equal to the reference signal frequency divided by N2). Hsieh provides a target system to be regulated (40,50,60) and the target system provides an output in the form of a plurality of digital signals defining a feedback pulse train (output of 60). Hsieh further compares (at 10) the frequency of the reference pulse train (output of 82) with the frequency of the feedback pulse train (output of 60); generates a control signal based on the comparison (output of 31); and provides the control signal as an input to the target system.

Hsieh teaches comparing pulse trains and generating a control signal in response to the comparison. See figure 1 and note elements 10, 30, 31, 60, 82 and their description. Also note that the frequency output of element 82 is dependent on the control signal output by element 70 and that the pulse output of element is a function of time (varies with time).

Hsieh however does not state that the leading edges of the pulses are used by the phase comparator to determine the error.

Long in col. 10, lines 61-65; and O'Sullivan in col. 4, lines 59-65; teach comparing the leading edges of pulse trains for ease in determining the phase error.

It would have been obvious to one of ordinary skill in the art to modify Hsieh in view of Long or O'Sullivan and use the leading edges for ease in determining the phase error.

In regards to claims 3 and 5, element 21 of Hsieh generates a pulse train (+ or -) that represents the error between the pulse trains. Note figures 6A- 7C.

In response to applicant's arguments, element 10 inherently serves to compare the reference pulse train frequency to the feedback pulse train frequency. This statement of inherency can be shown as follows.

Hsieh in figure 1 shows inputting signals $P_2(t),\omega_2,\Theta_2$ and $P_1(t),\omega_1,\Theta_1$ into element 10 and note that both ω_2 and ω_1 are used implying that the frequencies of the two signals ω_2, ω_1 are not the same. Further Hsieh even labels element 10 using the initials PFD which stands for phase-frequency detector. This statement about the meaning for PFD finds support in the article " A Phase/Frequency-Locked Controller for Stepping Servo Control Systems" by Jung-Chien Li and Guan-Chyun Hsieh (Hsieh is the inventor of the 5,212,434 patent being used in the claim rejection). Specifically support for this assertion about the meaning of PFD is found at page 116, second column, in which it is revealed that the "phase comparator " is actually a frequency-phase comparator (MC4044) not just a phase detector. In other words the PFD also compares frequencies and is not solely a phase detector as applicant argues. Note also the block diagram of Figure 5 in the article labels the "phase detector " as a

PFD just as the "phase detector" in the patent is labeled. Additionally note the similarity and common features between the block diagram of figure 5 of the article and figure 1 of the 5,212,434 patent. In view of this showing it is clear that the PFD of the Hsieh patent serves to compare frequencies not just phases as applicant argues.

Further In regards to the arguments about substantially aligning leading edges, substantially allows some variance and does not require that the leading edges be exactly aligned as applicant appears to argue, and is met by the applied combination as set forth above.

For the above reasons, it is believed that the rejections should be sustained.

L. P. Picard

Respectfully submitted,
Steven R. Garland
Steven R Garland
Examiner
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